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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT-Article 36 and Rule 70)

Applicant's or agent's file reference 19624PC DVA 11	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 02/05446	International filing date (day/month/year) 26.04.2002	Priority date (day/month/year) 26.04.2002
International Patent Classification (IPC) or both national classification and IPC G11B7/0065		
Applicant DISCOVISION ASSOCIATES et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 12 sheets, including this cover sheet.
- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:
- I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☒ ~~Non-establishment of opinion with regard to novelty, inventive step and industrial applicability~~
 - IV ☒ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 21.07.2003	Date of completion of this report 13.07.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Stemmer, M Telephone No. +49 89 2399-2282 

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International application No: **PCT/EP 02/05446**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-15 as originally filed

Claims, Numbers

1-61 as originally filed

Drawings, Sheets

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 15,20,46,51,61

because:

☒ the said international application, or the said claims Nos. 15,20,46,51 relate to the following subject matter which does not require an international preliminary examination (specify):

see separate sheet

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 61 are so unclear that no meaningful opinion could be formed (*specify*):

see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos.

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the Standard.

☐ the computer readable form has not been furnished or does not comply with the Standard.

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees, the applicant has:

☐ restricted the claims.

☒ paid additional fees.

☐ paid additional fees under protest.

☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

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3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

☐ complied with.

☒ not complied with for the following reasons:

see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

☐ all parts.

☒ the parts relating to claims Nos. 1-14, 16-19, 21-45, 47-50, 52-60 .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	4,6,9-12,14,19,21-31,35,37,38,40-43,45,50,52-60
	No: Claims	1-3,5,7,8,13,16-18,32-34,36,39,44,47-49
Inventive step (IS)	Yes: Claims	4,9-12,19,21-31,35,40-43,50,52-60
	No: Claims	1-3,5-8,13-14,16-18,32-34,36-39,44,45,47-49
Industrial applicability (IA)	Yes: Claims	1-14,16-19,21-37,39-45,47-50,52-60
	No: Claims	38

2. Citations and explanations

see separate sheet

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Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The additional feature of claims 15,20,46,51 "the reference beam is coherent or incoherent" adds no additional feature since there is no third possibility between "coherent" and "incoherent".
No opinion can be established for said claims.
2. Claim 61 is dependent on claim 69, however no such claim is filed.
No opinion can be established for this claim.

Re Item IV

Lack of unity of invention

1. Reference is made to the following documents:

D1: EP-A-1 065 658 (HORIMAI HIDEYOSHI ;OPTWARE CORP (JP)) 3 January 2001 (2001-01-03)
D2: HSIN-YU SIDNEY ET AL: 'THREE-DIMENSIONAL HOLOGRAPHIC DISKS' APPLIED OPTICS, OPTICAL SOCIETY OF AMERICA, WASHINGTON, US, vol. 33, no. 17, 10 June 1994 (1994-06-10), pages 3764-3774, XP000454720 ISSN: 0003-6935

2. The application contains multiple independent claims in the same category (claim ~~1,7,8,16,21,25 claiming an apparatus, claims 32,39,47,52,56 claiming a method~~).

The common technical features of apparatus claim 1 with the other apparatus claims is: An apparatus comprising a first diffractive holographic data storage device having a first set of holograms stored thereon; a second diffractive holographic data storage device having a second set of holograms stored thereon which is known from D1 (fig 1,2,45; par 43-58; par 155; par 159).

The further common technical features of apparatus claim 7 with the apparatus claims 21 and 25 is a reflective diffractive holographic data storage device having a first set of holograms stored thereon; and a transmissive diffractive holographic data storage device having a second set of holograms stored thereon, the transmissive and reflective diffractive holographic data storage devices being attached together which is known from D2 (fig 3).

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The further common technical features of the apparatus claim 8 with the apparatus claim 16 is an apparatus for reading a double-sided diffractive holographic data storage device having first and second reflective holograms stored on first and second sides respectively, comprising a multi-scanning device for directing a reference beam incident on one of the first and second sides at a predetermined angle; and a detecting device for detecting the reference beam reflected from the storage device which is known from D1 (fig 1,2,45; par 43-58; par 155; par 159).

This applies mutatis mutandis to the method claims.

The requisite unity of invention (Rule 13.1 PCT) therefore no longer exists inasmuch as a technical relationship involving one or more of the same or corresponding special technical features in the sense of Rule 13.2 PCT does not exist between the subject-matter of the following groups of independent claims forming the following concepts:

- (i) "opaque layer" concept of claims 1-6 and 32-38;
- (ii) "transmissive and reflective diffractive holographic data storage devices being attached together" concept of claim 7;
- (iii) "apparatus for reading a double-sided diffractive holographic data storage device having first and second reflective holograms stored on first and second sides respectively" concept of claims 8-15 and 39-46;
- (iv) "multi-scanning device for directing a read beam incident upon a side of the diffractive device at a predetermined angle" concept of claims 16-20 and 47-51;
- (v) "multi-scanning device for directing a read beam incident on the first side, wherein a first portion of the read beam forms a first diffractive holographic image, wherein the image is produced by reflective diffraction from the first side, and wherein a second portion of the read beam is transmitted through the diffractive holographic data storage device and forms a second diffractive holographic image" concept of claims 21-24, 28-30, 52-55, 59;
- (vi) "holographic unit having a front surface and a back surface wherein a reflective hologram is formed by interference between object and reference beams on the front surface" concept of claims 25-27, 31, 56-58, 60.

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step

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or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

D1: EP-A-1 065 658 (HORIMAI HIDEYOSHI ;OPTWARE CORP (JP)) 3 January 2001 (2001-01-03)

D2: HSIN-YU SIDNEY ET AL: 'THREE-DIMENSIONAL HOLOGRAPHIC DISKS' APPLIED OPTICS, OPTICAL SOCIETY OF AMERICA, WASHINGTON, US, vol. 33, no. 17, 10 June 1994 (1994-06-10), pages 3764-3774, XP000454720 ISSN: 0003-6935

D3: WO 00 30084 A (CAMBRIDGE SCIENT INC) 25 May 2000 (2000-05-25)

2. The subject-matter of claims 1-3,5,7,8,13,16-18,32-34,36,39,44,47-49 is not novel (Art 33(2) PCT) and the subject-matter of claims 6,14,37,45 is not involving an inventive step (Art 33(3) PCT), and the subject-matter of claim 38 is not applicable in industry (Art 33(4) PCT) for the following reasons:

3. As for claim 1 D1 (reference signs hereafter are applying to D1) discloses an apparatus (fig 1 par 43-44) comprising a first diffractive holographic data storage device having a first set of holograms (225) stored thereon, a second diffractive holographic data storage device having a second set of holograms (225) stored thereon; and an opaque layer (221) disposed between and attached to one side of the first and second diffractive holographic data storage devices (D1 fig 45; par 159; par 155 stipulates that a double sided medium can be used in place of a single side medium shown in fig 1).

~~The subject-matter of claim 1 is therefore not novel (Art 33(2) PCT).~~

This applies mutatis mutandis to claim 32.

4. As for claim 2 D1 further discloses that the first and second diffractive holographic data storage devices are reflective holograms (par 76).

~~The subject-matter of claim 2 is therefore not novel (Art 33(2) PCT).~~

This applies mutatis mutandis to claim 33.

5. As for claim 3 D1 further discloses that the first and second diffractive holographic data storage devices include multiplexed holograms (par 75).
The subject-matter of claim 3 is therefore not novel (Art 33(2) PCT).

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This applies mutatis mutandis to claim 34.

6. The combination of the features of dependent claim 4 is neither known from, nor rendered obvious by, the available prior art. It is suggested therefore that a new independent claim be drafted to include these features, bearing in mind that the features known in combination in D1 should be placed in the preamble of such a claim in accordance with Rule 6.3(b) PCT.

The problem to be solved is considered to provide means for increasing the storage capacity by angularly multiplexing.

This applies mutatis mutandis to claim 35.

7. As for claim 5 D1 further discloses that the first and second diffractive holographic data storage devices include an organic material (photopolymer par 44).

The subject-matter of claim 5 is therefore not novel (Art 33(2) PCT).

This applies mutatis mutandis to claim 36.

8. As for claim 6 the use of an organic material being a polypeptide is considered to be an equivalent substitution known from D3 (p 5 l 13- p 6 l 28)
The subject-matter of claim 6 therefore lacks inventive step (Art 33(3) PCT).

This applies mutatis mutandis to claim 37.

9. As for claim 7 D2 (fig 3 p 3766 col 1) discloses an apparatus comprising a reflective diffractive holographic data storage device having a first set of holograms stored thereon; and a transmissive diffractive holographic data storage device having a second set of holograms stored thereon, the transmissive and reflective diffractive holographic data storage devices being attached together.
The subject-matter of claim 7 is therefore not novel (Art 33(2) PCT).

10. As for claim 8 D1 discloses an apparatus (fig 17-18,30-33,45;par 114-123, 144-146,159) for reading a double-sided diffractive holographic data storage device having first and second reflective holograms stored on first and second sides respectively (fig 45 par 159,155) comprising a multi-scanning device (140A,140B) for directing a reference beam incident on one of the first and second sides at a

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predetermined angle; and a detecting device (133 in 140A and 140B) for detecting the reference beam reflected from the storage device.

The subject-matter of claim 8 is therefore not novel (Art 33(2) PCT).

This applies mutatis mutandis to claim 39.

11. The combination of the features of dependent claim 9 is neither known from, nor rendered obvious by, the available prior art. It is suggested therefore that a new independent claim be drafted to include these features, bearing in mind that the features known in combination in D1 should be placed in the preamble of such a claim in accordance with Rule 6.3(b) PCT.

The problem to be solved is considered as to render each side accessible by a single scanning device.

This applies mutatis mutandis to claim 40.

12. The combination of the features of dependent claim 12 is neither known from, nor rendered obvious by, the available prior art. It is suggested therefore that a new independent claim be drafted to include these features, bearing in mind that the features known in combination in D1 should be placed in the preamble of such a claim in accordance with Rule 6.3(b) PCT.

The problem to be solved is considered to provide means for increasing the storage capacity by angularly multiplexing.

This applies mutatis mutandis to claim 43.

13. As for claim 13 D1 further discloses that the double-sided device includes an organic material (photopolymer par 44).

The subject-matter of claim 13 is therefore not novel (Art 33(2) PCT).

This applies mutatis mutandis to claim 44.

14. As for claim 14 the use of an organic material being a polypeptide is considered to be an equivalent substitution known from D3 (p 5 l 13- p 6 l 28)

The subject-matter of claim 14 therefore lacks inventive step (Art 33(3) PCT).

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This applies mutatis mutandis to claim 45.

15. As for independent claim 16 D1 discloses an apparatus (fig 17-18,30-33,45;par 114-123, 144-146,159) for reading dual layer located on a diffractive device (1) comprising: a first multi-scanning device (140A) for directing a first read beam incident upon a first side of the diffractive device at a first predetermined angle; a second multi-scanning device (140B) for directing a second read beam incident upon a second side of the diffractive device at a second predetermined angle; a first detecting device (133 of device 140A) for detecting a first diffractive packet data output formed by the first reflectively diffracted read beam reflectively diffracted from the first side; and a second detecting device (133 of device 140 B) for detecting a second diffractive holographic image formed by the second reflectively diffractive read beam reflected from the second side.
The subject-matter of claim 16 is therefore not novel (Art 33(2) PCT).

This applies mutatis mutandis to claim 47.

16. As for claim 17 D1 further discloses that the first read beam is generated from a coherent or non-coherent light having a same wavelength as a recording light (par 140 the same light source 112 is used for recording and reproducing).
The subject-matter of claim 17 is therefore not novel (Art 33(2) PCT).

This applies mutatis mutandis to claim 48.

17. As for claim 18 D1 further discloses that the second read beam is coming from a laser (par 115) or a portion of the first read beam is coming through a beam splitter (116 in fig 17, par 115).
The subject-matter of claim 18 is therefore not novel (Art 33(2) PCT).

This applies mutatis mutandis to claim 49.

18. The combination of the features of dependent claim 19 is neither known from, nor rendered obvious by, the available prior art. It is suggested therefore that a new independent claim be drafted to include these features, bearing in mind that the features known in combination in D1 should be placed in the preamble of such a claim in accordance with Rule 6.3(b) PCT.

The problem to be solved is considered to provide means for increasing the

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storage capacity by angularly multiplexing.

This applies mutatis mutandis to claim 50.

19. As for claim 21 D1 which is considered to be the closest prior art discloses an apparatus (fig 1 par 43-44) comprising a diffractive holographic data storage device (1) having a first side with a reflective hologram (3 and reflective layer 5) stored thereon; a multi-scanning device (11) for directing a read beam incident on the first side, wherein a first portion of the read beam forms a first diffractive holographic image, wherein the image is produced by reflective diffraction from the first side; a first detector for detecting (20) output data packet produced by reflective diffraction from the first side.

The subject-matter of present claim 21 differs from the disclosure of D1 in that said diffractive holographic data storage device has further a second side with a transmissive hologram stored thereon;

and that in the apparatus a second portion of the read beam is transmitted through the diffractive holographic data storage device and forms a second diffractive holographic image;

and that the apparatus further comprises a second detector for detecting the output data packet produced by transmission diffraction from the second side.

The problem to be solved is considered as to provide means for increasing storage capacity.

Independent claim 21 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

Independent claim 21 should therefore be redrafted accordingly. In addition, the applicant should ensure that it is clear from the description which features of the subject-matter of claim 21 are already known in combination from the document D1 (see the PCT Guidelines, III-2.3a).

This applies mutatis mutandis to claim 52.

20. As for claim 25 D1 which is considered to be the closest prior art discloses a holographic device (fig 30-33) comprising a first holographic unit (1 upper half in

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fig 45) having a first front surface (222) and a first back surface (221) wherein a reflective hologram (225) is formed by interference between object and reference beams on the first front surface; and a second holographic unit (1 upper half in fig 45) having a second front surface (222) and a second back surface (221) (D1 par 144-146, 159).

The subject-matter of present claim 25 differs from the disclosure of D1 in that a transmissive hologram is formed on the second front surface and the second front surface being attached to the first back surface.

The problem to be solved is considered as to provide means for increasing storage capacity.

Independent claim 25 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

Independent claim 25 should therefore be redrafted accordingly. In addition, the applicant should ensure that it is clear from the description which features of the subject-matter of claim 25 are already known in combination from the document D1 (see the PCT Guidelines, III-2.3a).

This applies mutatis mutandis to claim 56.

21. The method of claim 38 makes no sense since the transmissive hologram would be inaccessible for any reading or writing due to the adjacent opaque layer.
The method is not applicable in industry (Art 33(4) PCT).

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